

REFERENCE 11

ANL-W ESH Manual

**"Sanitary Lagoon Environmental Sampling Procedure"
(Section IX, Chapter 25), December 1990**

SECTION IX - CHAPTER 25

SANITARY LAGOON ENVIRONMENTAL SAMPLING PROCEDURE

1.0 PURPOSE

This chapter provides the procedures to be used to collect liquid samples from the Argonne National Laboratory-West (ANL-W) sanitary lagoons for a variety of subsequent analyses. The use of these procedures will ensure that ANL-W meets sampling commitments outlined in DOE Orders 5400.1, 5400.5, and 5400.6. In addition, use of these procedures will provide assurance that sample integrity is maintained from the time of collection in the field until the time of analysis. Normally, sanitary lagoon samples are to be collected in conjunction with the collection of industrial waste pond samples (see Chapter 24, Section IX, of this manual).

2.0 GENERAL

Sanitary lagoon samples are collected for several types of analyses. The analytes and corresponding sampling frequencies and collection points are as follows:

2.1 ANALYTES: PRIMARY LAGOON

Alpha activity	Beta activity
Gamma-emitting nuclides	Tritium
Cadmium	pH

Frequency: Monthly (April through October)

2.2 ANALYTES: SECONDARY LAGOON

Gamma-emitting nuclides	Low-level plutonium
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Frequency: Semi-annually (April and October)

2.3 ANALYTES: SECONDARY LAGOON and BLDG. 778 LIFT STATION

Biological Oxygen Demand (BOD)	pH
Suspended Solids	Dissolved Oxygen (DO)

Frequency: Monthly (April through October)

In addition to directing the collection of the samples described above, Environment, Waste Management (EWM) personnel shall also:

- (1) Take monthly (April through October) pH and/or dissolved oxygen (DO) readings, as applicable.

- (2) Collect trip blanks, equipment blanks, and field duplicates as described in 3.1.

3.0 REQUIREMENTS

- 3.1 Trip blanks, equipment blanks, and field duplicate samples shall be collected. Refer to 3.3, Chapter 6, Section IX, of this manual, for the procedures to be used to collect these samples.

3.1.1 Trip blanks

- a. One 1-liter trip blank will be prepared each month. This trip blank will cover the monthly samples collected at both the sanitary lagoon sources and at the industrial waste pond and is also referred to in 3.1.1.a, Chapter 24, Section IX, of this manual.
- b. A trip blank will be prepared for both the April and October low-level plutonium, gamma-emitting nuclides samples. A single 1-gallon trip blank will represent both the sanitary and IWP samples. This is the same trip blank referred to in 3.1.1, Chapter 24, Section IX, of this manual.

3.1.2 Equipment Blanks

- a. One 1-liter equipment blank shall be collected while at the sanitary lagoon in April of each year. It shall be analyzed for the analytes listed in 2.1.
- b. An equipment blank will not be collected for the April and October low-level plutonium, gamma-emitting nuclide samples due to the low probability of this type of inadvertent contamination.

3.1.3 Field Duplicates

- a. One 1-liter field duplicate shall be collected at the primary lagoon in April of each year. It shall be collected, handled, and analyzed following the procedure used for the true sample, see 3.2.
- b. Field duplicates shall be collected monthly in conjunction with the samples collected in 3.4. This collection is explained in 3.4.

3.2 ANALYTES LISTED IN 2.1 WILL BE SAMPLED AS FOLLOWS:

- 3.2.1 The appropriate number of pre-cleaned one-liter polyethylene bottles must be obtained by EWM from Stores prior to the planned sampling. If pre-cleaned bottles are not available, non-cleaned polyethylene bottles can be used if cleaned by ANL-W Analytical Laboratory (AL) personnel. Cleaning involves rinsing a bottle with a 1:1 solution of nitric acid and deionized (DI) water, followed by rinsing the bottle with DI water twice.
- 3.2.2 Once the sample bottles leave stores or the AL, they shall be under the direct custody of EWM or be locked in a secure area maintained by EWM.
- 3.2.3 Before leaving for the sample site, EWM shall obtain the required number of sample numbers from the EWM Chain-of-Custody (COC) log. The next available sample numbers (ANL-#-last two numbers of the year) in the Chain-of-Custody (COC) log shall be assigned to the samples to be collected and shall be recorded on the appropriate sample labels, in the Environmental Monitoring (EM) field log book, in the COC log, and, if one is used, on the sample analysis request form.
- 3.2.4 Prior to leaving for the sample sites, EWM shall calibrate the portable pH/DO meter. All calibration procedures shall be followed in accordance with the manufacturers instructions and shall be recorded in the EM field log book.
- 3.2.5 EWM shall meet with the Plant Services (PS) representative at the time previously agreed upon. EWM shall bring all items required for sampling (see Attachment 1) except the extension rod; this will be brought by the PS representative.
- 3.2.6 EWM shall observe the sample collection by PS personnel, assist as necessary, and record data in the EM field log book.
- 3.2.7 Sample collection involves the following:
 - a. Mentally divide the lagoon into four quadrants, sample from a different quadrant of the PRIMARY lagoon each sampling period. Each of the four quadrants shall be sampled once in a four month period.

- b. Select a sample site and collect the sample a minimum of three feet from the shore line.
- c. Label the bottle just prior to sample collection with:
 - (1) Date
 - (2) Time
 - (3) Pond designation (industrial vs sanitary)
 - (4) Quadrant sampled
 - (5) Sample number (see 3.2.3 for instructions)
 - (6) Name of person collecting the sample.
- d. Collect the sample (wearing rubber gloves):
 - (1) Attach the uncapped bottle to the extension rod.
 - (2) Submerge the bottle beneath the lagoon surface until a small amount of liquid enters the bottle.
 - (3) Rinse the inside of the bottle with the liquid, then dump the liquid out.
 - (4) Submerge the bottle beneath the lagoon surface, fill the bottle with lagoon liquid.
 - (5) Retrieve the sample bottle and secure the cap.
- e. Wash off the exterior of the sample bottle with DI water.

3.2.8 The information recorded on the sample bottle shall also be recorded in the EM field log book.

3.2.9 The following pH and/or DO readings shall be taken monthly at the indicated sanitary lagoon sources in conjunction with the physical collection of the above mentioned liquid samples using procedures provided by the instrument manufacturer. This data shall be recorded in the EM field book.

Building 778 (Lift Station) - pH

Primary Lagoon - pH

Secondary Lagoon - pH and DO

3.2.10 A visual check for oil and grease on the lagoon shall be made and recorded in the EM field log book.

3.2.11 EWM shall maintain visual contact with the sample from time of collection until it is taken to the AL. If this is not possible:

a. EWM shall affix a COC seal to the sample bottle in such a way that the seal must be broken if the sample bottle is opened.

b. An ANL-W COC form is to be filled out by EWM.

(1) EWM shall sign in the "Relinquished by: (Signature)" blank.

(2) The person assigned to deliver the sample to the AL will sign in the "Received by: (Signature)" blank.

(3) This form will accompany the sample to the AL.

3.2.12 If a COC form has not already been initiated, one will be initiated by EWM when the sample is delivered to the ANL-W AL.

3.2.13 Upon delivery to the AL:

a. The sample deliverer shall sign in the "Relinquished by: (Signature)" blank

b. AL personnel shall sign in the "Received for Laboratory by: (Signature)" blank and shall mark the appropriate boxes.

c. A copy of the COC form, appropriately completed, shall be returned to EWM by AL personnel.

3.2.14 The sample shall be split and appropriately preserved by AL personnel immediately upon receipt.

3.3 ANALYTES LISTED IN 2.2 SHALL BE SAMPLED AS FOLLOWS:

- 3.3.1 Prior to actual sample collection an ANL-W Shipping Order must be filled out and an authorized signature obtained by EWM.
- 3.3.2 The same procedures as delineated in 3.2.1 through 3.2.11 shall be followed with the following exceptions:
 - a. Where one 1-liter sample bottle was used in 3.2, three 1-gallon polyethylene sample bottles shall be used in 3.3.
 - b. The word "sample" in 3.3 will refer to all three, filled, 1-gallon sample bottles.
 - c. Each of the three bottles comprising the one sample will each be filled in a different quadrant of the SECONDARY lagoon. The fourth quadrant, the one that does not get sampled in April, shall be one of the quadrants sampled during the second sampling in October.
 - d. Enough room must be left in each sample bottle to add up to 15 ml of nitric acid later.
- 3.3.3 The samples shall be preserved to a pH of <2 using concentrated nitric acid (approximately 5 ml per 1-gallon bottle) by AL personnel.
- 3.3.4 Following preservation, a COC seal shall be affixed to each sample bottle by EWM in such a way that the seal must be broken if the bottle is opened.
- 3.3.5 At this point a COC form is to be filled out by EWM. This form will accompany the sample to Materials Supply (MS) and ultimately ANL-E, being signed each time someone new relinquishes responsibility for the sample. The sample shall remain in the custody of the person listed on the COC form or be locked in a secure area.
- 3.3.6 The sample shall be delivered to MS personnel, who shall arrange for a radioactive contamination survey of the sample, package, and ship the sample (with the COC paperwork and the analysis form) to the ANL-E Analytical Laboratory. Copies of the COC form, appropriately completed, shall be returned to EWM by both MS personnel and ANL-E AL personnel.

- a. The samples shall remain in the custody of the person listed on the COC form or be locked in a secure area at all times.
- b. When MS personnel ship the sample, they should write "transferred to Shipping Order #XXXXX", in the "Received by: (Signature)" blank after they sign in the "Relinquished by: (Signature)" blank.

3.4 ANALYTES LISTED IN 2.3 SHALL BE SAMPLED AS FOLLOWS:

- 3.4.1 Four clean, glass, ground-glass stoppered, 500 ml containers shall be provided by the Westinghouse Idaho Nuclear Company (WINCO) Laboratory.
- 3.4.2 Once the sample containers are delivered to ANL-W, they shall be under the direct custody of EWM (or a designated alternate) or be locked in a secure area maintained by EWM.
- 3.4.3 EWM shall call the Supervisor, Environmental Analysis Group, at WINCO to confirm the date that the WINCO courier will be picking up the samples, to determine when the samples should be collected. This is normally the third Wednesday of each month (April through October).
- 3.4.4 The same procedures as delineated in 3.2.3 through 3.2.10 shall be followed, with the following exceptions:
 - a. Sample bottles shall be wiped off with paper towels rather than washed off following sample collection.
 - b. Samples are to be taken at both the Bldg. 778 Lift Station (raw) and secondary lagoon (final).
 - c. Two (duplicate) samples are to be taken at each location. In the secondary lagoon these duplicate samples should both be taken from the same spot in the same quadrant. The lift station samples should both be taken from the same dipper bucket sample.
 - d. Bottles are to be filled such that a small amount of sample is displaced when the stopper is inserted. Care must be taken not to create or trap air bubbles during the sampling process.

- 3.4.5 The four samples shall be placed in the WINCO supplied metal shipping container.
- 3.4.6 EWM shall maintain visual contact with the samples from time of collection until they are locked in a refrigerator accessible only to authorized personnel. The samples shall be refrigerated as soon as practical following collection.
- 3.4.7 EWM shall arrange for a radioactive contamination survey of the samples.
- 3.4.8 The samples are to be refrigerated in the locked EWM refrigerator until the WINCO courier arrives to pick up them up. No preservatives are added to these sample bottles.
- 3.4.9 When the WINCO courier calls from the ANL-W gatehouse, EWM will take the samples to the gatehouse.
- 3.4.10 Upon arriving at the gatehouse, EWM shall:
 - a. Allow the guard to inspect the shipping container.
 - b. Affix a COC seal to the outside of the shipping container in such a way that the seal must be broken if the container is opened.
 - c. Initiate a ANL-W COC form.
- 3.4.11 The samples shall be delivered to the WINCO laboratory courier at the ANL-W gatehouse.
 - a. All COC paperwork shall be completed
 - (1) EWM shall sign in the "Relinquished by: (Signature)" blank.
 - (2) The courier shall sign in the "Received for Laboratory by: (Signature)" blank and check the appropriate boxes.
 - b. A completed copy of the COC form shall be given to the WINCO courier; EWM shall keep the other copies.

4.0 RESPONSIBILITIES

4.1 ENVIRONMENT, WASTE MANAGEMENT PERSONNEL shall:

- 4.1.1 Obtain new sample bottles from Stores (except for those supplied by WINCO), deliver them to the ANL-W Analytical Laboratory for cleaning if necessary, and deliver cleaned bottles to the sampling site.
- 4.1.2 Initiate Shipping Orders, as necessary.
- 4.1.3 Arrange for appropriate laboratory analyses of the lagoon samples.
- 4.1.4 Assign unique numbers to each sample physically collected.
- 4.1.5 Provide assistance and direction to Plant Services personnel during all sampling campaigns.
- 4.1.6 Implement COC procedures as necessary.
- 4.1.7 Arrange for a radioactive contamination survey of the samples being sent to WINCO.
- 4.1.8 Assure that samples are delivered to the ANL-W Analytical Laboratory, Materials Supply, or WINCO courier, as appropriate, as soon as possible after collection.
- 4.1.9 Calibrate and operate the direct reading instrumentation for analysis of pH and dissolved oxygen.
- 4.1.10 Evaluate data results.
- 4.1.11 Provide an annual report of the results to DOE-CH and DOE-ID, as well as supply monthly BOD, DO, suspended solids, oil/grease, and pH data to the Waste Management Engineer for inclusion in the Industrial Waste Management Information System (IWMIS) report.

4.2 PLANT SERVICES PERSONNEL shall:

- 4.2.1 Perform all sanitary lagoon sampling.
- 4.2.2 Assist EWM with COC procedures.

4.3 ANL-W ANALYTICAL LABORATORY PERSONNEL shall:

- 4.3.1 Clean sample bottles provided by EWM.

- 4.3.2 Provide materials for and carry out appropriate preservation on sanitary lagoon samples.
- 4.3.3 Analyze lagoon samples for the analytes listed in 2.1 per ANL-W Analytical Methods Manual.
- 4.3.4 Assist EWM with COC procedures.
- 4.4 ANL-E ANALYTICAL CHEMISTRY LABORATORY PERSONNEL shall:
 - 4.4.1 Provide analytical services for those analytes listed in 2.2 per Standard Operating Procedures ACL-037 and ACL-072, respectively.
 - 4.4.2 Assist EWM with COC procedures.
- 4.5 MATERIALS SUPPLY PERSONNEL shall:
 - 4.5.1 Arrange for a radioactive contamination survey of the samples to be shipped to ANL-E. The survey shall be completed prior to packaging.
 - 4.5.2 Package and ship samples to the ANL-E AL.
 - 4.5.3 Assist EWM with COC procedures.
- 4.6 HEALTH PHYSICS PERSONNEL shall:
 - 4.6.1 Perform radioactive contamination surveys on samples to be sent off the ANL-W site.

5.0 REFERENCES

- 5.1 DOE Order 5400.1, "General Environmental Protection Program," November 9, 1988.
- 5.2 DOE Order 5440.5, "Radiation Protection of the Public and the Environment," February 8, 1990.
- 5.3 DRAFT DOE Order 5400.6, "Radiological Effluent Monitoring and Environmental Surveillance," September 14, 1988.
- 5.4 "Test Methods for Evaluating Solid Waste - Physical/Chemical Methods," 3rd Edition, EPA-SW-846.
- 5.5 Standard Methods for the Examination of Water and Waste Water, 17th edition, American Public Health Association.
- 5.6 State of Idaho Regulations, Title 1, Chapter 2, "Water Quality Standards and Wastewater Treatment Requirements."

ATTACHMENT 1

ENVIRONMENTAL SAMPLING CHECKLIST
SANITARY LAGOON

Call WINCO - Caroline Filby - to confirm sample pickup, normally the third Wednesday of the month.

Call Plant Services - Newell Bingham - to schedule sampling. Normally sample the morning of the day the WINCO samples will be picked up.

Signed shipping order (if April or October)	_____
Analysis request forms	_____
Field log book	_____
Sample numbers from COC log	_____
Chain of Custody form(s)	_____
COC seals	_____
Indelible marking pen	_____
Regular pen	_____
Trip blank(s) Monthly: (1) 1-liter	_____
April and October (1) 1-gallon	_____
Cleaned bottles	
Monthly: (1) 1-liter	_____
(4) 500-ml glass	_____
Additional in April: (3) 1-gallon	_____
(2) 1-liter	_____
Additional in October: (3) 1-gallon	_____
Deionized water	_____
pH/DO meter - calibrated	_____
Paper towels	_____
Rubber gloves - 4 to 6 pair	_____
Extension Rod	_____